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An Information Technology Model Curriculum Designed for Preparing Knowledge Workers and End-User Support Personnel

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Abstract

This paper presents a model curriculum for students studying organizational and end-user information systems (OEIS). Developed by the Organizational Systems Research Association (OSRA), the curriculum contains seven required and six elective courses which sit on a foundation of general education and core business courses. Core courses include an introduction to OEIS; computer user support; planning, design, implementation, and evaluation; technical training and delivery methods; telecommunications and networking; cases in information technology; and an internship. The elective courses comprise eBusiness and web technologies, collaborative technologies and knowledge management, network administration, operating systems, information systems security, and special topics. College and university faculty members in a variety of disciplines are invited to consider this model when revising or expanding their information systems curricula.

Keywords: organizational & end-user information systems curricula (OEIS), information technology, Organizational Systems Research Association (OSRA), curriculum development, end-user support personnel, end-user computing

Introduction

The need for information systems (IS) workers is growing, but the identification of the specific skills required for the variety of IS positions is not as clear (Noll & Wilkins, 2002). Information technology (IT) managers are challenged to find competent workers for their open positions. Computer security, data growth, data management, and the expansion of network technology also pose increasingly sophisticated challenges for IT managers. These challenges are enhanced by the constant change in information systems. Watson and Straub (2001) note that "with the explosion of the Internet and other networks (e.g., cell phone, cable TV, satellite downlinks and uplinks), systems that have been the historical focus of IS research are being rapidly transmogrified" (p. 1).

Over a decade ago, Trauth and Farwell (1993) identified a gap between IS/IT industry expectations and academic preparation. Continuous curriculum redesign and course updates are necessary to provide students with the essential skills needed upon graduation. Therefore, educational institutions must be willing to review their own curricula and investigate

how to update their curricula to produce technically competent students with the skills necessary to succeed in the business world. "The number of workers in the computer and software industries has almost tripled in the past decade" (Freeman and Aspray, 1999, 35). Consequently, academia faces the difficult task of providing up-to-date curricula in an environment that is constantly changing.

This only emphasizes how educational institutions can help bridge the gap and produce qualified graduates who will become qualified applicants for the available positions in the information systems world. Those responsible for teaching key courses in the area of information technology must ensure that the curricula and courses result in the achievement of the critical skills required to advance in the job market or to continue in an advanced degree program. Developments in e-commerce, wireless networks, and other advances in technology will only increase the need to update skills. The challenges of end-user support and information technology implementation go far beyond solving technical problems, however. An understanding of how businesses work along with interpersonal and management skills are also necessary. Hoplin (2003) provides an interesting thought by noting that "the rapid proliferation of emerging information technologies drives home the point that IS cannot run in place without losing ground" (p.1).

Gonzenbach (1998) recommends that most emphasis should be placed on teaching telecommunications, operating systems, systems analysis and design, networking, and business communications. Many people believe that for prospective employees to be competitive in the information technology market, programming is an essential skill. Meares and Sargent (1999) report in the U. S. *Department of Commerce Technology Administration Office of Technology Policy*, however, that programming positions did not grow as rapidly (2.2%) during the 1983 – 1998 period as computer scientists, systems analysts, and engineers (11.8%). During the period between 1995 and 1998, "computer systems analysts and scientists recorded an annual average job growth rate of 16.4%, while computer programmers scored a 3.7% annual job growth" (Meares & Sargent, 1999, p. 22). Meares and Sargent predict that the IT area will grow from 1.5 million in 1996 to 2.6 million in 2006. "During this period, the United States will require more than 1.3 million new highly skilled information technology workers in these occupations – an average of about 137,800 per year – to fill newly created jobs (1,134,000) and to replace workers who are leaving these fields (244,000)" (Meares & Sargent, 1999, p. 25).

Computer programmers have the slowest growth rate out of the four previously mentioned information technology related occupations. Meares and Sargent (1999) state that "compared to other core information technology occupations, computer programming has a slow projected growth rate over the ten-year projections period (23 percent versus more than 100 percent for the other three core IT occupations)" (27). This slow growth is due to outsourcing, automation in code writing, and advancements in programming languages. Information technology departments need employees with a variety of skills, and they are particularly looking for information technology skills that will not only support but also enable business operations.

The Organizational Systems Research Association (OSRA), a research organization consisting of innovative business practitioners and faculty, has redesigned and implemented its 1996 curriculum model to meet the needs of technology-based businesses for the 21st century. The goal of the OEIS curriculum is to provide a cornerstone on which graduates can build successful careers in end-user IT. OSRA has developed a model intended to keep pace with current IT requirements and to address the existing shortcomings of IT education. Through a review of literature, other curricula, and the investigation of business and industry needs, the organization has ascertained the competencies that information technology professionals charged with organizational and personal performance technologies need to have. This model emphasizes organizational and technology issues needed to support the emerging technologies of the 21st century. This curriculum supports the concept that end-user computing is crucial to the well-being and success of any enterprise.

Model Curriculum Overview

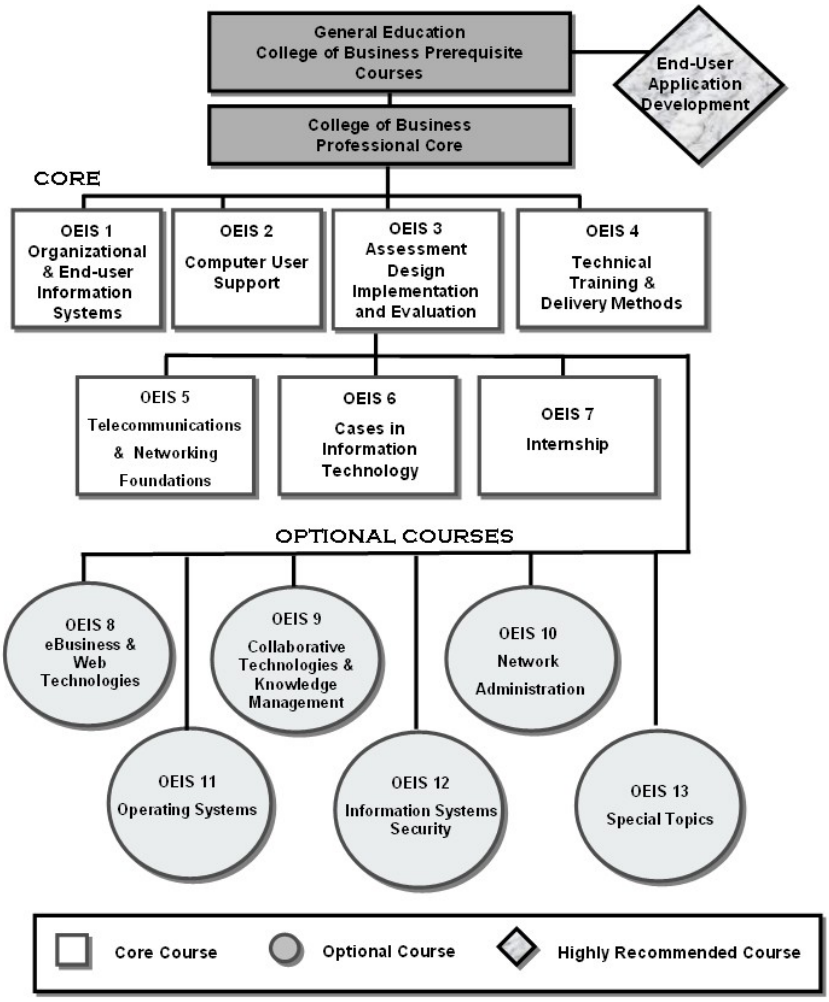
The philosophy underlying the OEIS model curriculum is similar to that of Watts (1999), who believes that technology is not simply a curriculum content area, but rather an approach to learning and the application of knowledge. Watts also discussed the definition of technology put forward by the Australian Education Council. This definition includes creating products and processes via a purposeful application of knowledge, experience and resources to meet the needs of users. The OEIS curriculum incorporates technical knowledge in pursuit of meeting these human needs.

The OEIS Curriculum is designed for a four-year college and best fits in a school of business where students have a liberal arts foundation and study the core business curriculum. However, it may be effectively implemented in other schools (e.g., education, computer science, technical studies) where the business common body of knowledge (accounting, economics, marketing, management, business law, business communications, and statistics) may be included. Interpersonal skills, teamwork, communications skills, information security, and ethical considerations are developed and practiced across the entire curriculum.

The OEIS curriculum model illustrated in Figure 1 (Organizational End-User Information Systems (OEIS) Curriculum Task Force, 2004) assumes that the general education requirements are fulfilled. It is highly recommended that an end-user

application development course also be completed. For flexibility, the curriculum then is divided into core course and optional courses. The OEIS courses are briefly described below.

Figure 1. Organizational and End-User Information Systems Curriculum Model



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Required Courses

OEIS 1 - Organizational and End-user Information Systems

An overview of organizational and end-user information systems (OEIS) technologies, business processes, and worker performance, this course emphasizes the methods used to plan for and implement information technologies in the workplace. It discusses advances in information systems hardware and software, emphasizing applications designed for technology end users. The course stresses understanding end-user needs and how to select or design systems to address those needs. Work flow and systems analysis methodology, work (re)design, organizational change, systems implementation, and management issues are covered. Basic computer literacy is assumed. As an introduction to the OEIS curriculum, this course provides an overview of course content covered in depth in future courses.

OEIS 2 - Computer User Support

This course introduces the responsibilities of a computer user support specialist and develops skills for microcomputer troubleshooting. Students develop the expertise necessary to work with help desk and support center operations to fulfill end user support needs. Students examine how to support and communicate with non-computer professionals. They also use a

variety of software, including remote management tools, call tracking software, and programs to support the statistical analysis of calls/issues. Students develop problem-solving skills and install, configure, and troubleshoot microcomputer hardware and software. The prerequisites are computer literacy and demonstrated skills in using hardware and application software.

OEIS 3 - Planning, Design, Implementation, & Evaluation

This course covers the four stages of OEIS development: assessment, design, implementation, and evaluation. Students learn methods and procedures that empower them to define and solve large-scale OEIS problems or address new opportunities. In studying the integration of hardware/software into jobs and the work environment, the course will give attention to various organizational development and management factors including strategic planning, techniques for developing ROI, planned change strategies, human factors, and job redesign. Students will complete a systems analysis and design proposal with special attention given to inter-organizational goals. The prerequisite is OEIS 1.

OEIS 4 - Technical Training & Delivery Methods

This core course builds upon skills and knowledge acquired in OEIS 1, 2, and 3. Students briefly overview change management, learning, and training theory in conjunction with technical training practices. These training practices are supportive of and conducive to organizational and end-user information systems implementation where OEIS tools are to be integrated into the work environment. Students focus on the design, development, and delivery of technical training. Students investigate and apply delivery methods including both traditional and state-of-the-art techniques. Planned change strategies (including addressing resistance to change) for technology implementation are also addressed, along with the application of relevant theories and evaluation of technical training effectiveness.

OEIS 5 - Telecommunications & Networking Foundations

This course provides foundation information and skills relating to telecommunications and networking in the business environment, including conceptual information, telecommunication applications, networking fundamentals, and the use the Internet/intranets. Management issues and practical applications are an integral part of this course.

OEIS 6 - Cases in IT

A capstone course, this class involves the analysis, synthesis, evaluation, and application of advanced concepts, theories, principles, and skills associated with information technologies through case studies of the development of solutions to business problems and the redesign of business processes. The course is ideally taken in the student's last term before graduation. The prerequisites are OEIS 1 through 5.

OEIS 7 - Internship

This course is designed to provide the senior-level student experiential learning related to information technology in an approved on-campus or off-campus site. Students may perform information systems trainer/consultant and/or end-user support duties. Students will meet periodically with the instructor to discuss problems and issues relevant to the area of organizational and end-user information systems. Compensation may or may not be granted for the internship.

Elective Courses

OEIS 8 - eBusiness & Web Technologies

This optional course or course stream is dedicated to investigating the implementation and administration of Web-based applications for non-profit and for-profit organizations in which e-business has become an integral part of the business model. It will provide the students with a foundation in the fundamentals of evolving Internet technologies and Web authoring using currently popular Web development software. Topics include e-business models and strategies, intermediate and advanced HTML, design principles of e-learning content, Website hosting and setup procedures, Web server administration, information security, Internet protocols, XML, dynamic PHP/MySQL and ASP/JSP Web content driven by back-end databases, and streaming media. The students will apply the knowledge and skills learned to create or redesign

actual e-business websites. The students are required to publish their projects on the Internet and ensure that all features and functions are properly working and the means of ongoing maintenance and updates are specified.

OEIS 9 - Collaborative Technologies & Knowledge Management

This course is designed to provide the senior-level OEIS student with an introduction to group decision support systems, electronic meeting management, desktop video conferencing, and other groupware applications. Students will be introduced to concepts fundamental to an understanding of groupware tools and various collaborative technologies for enhancing group processes and computer-mediated communication in today's digital economy. The course addresses a wide range of topics including the implementation and design group support systems (GSS), electronic facilitation, and GSS as an enabling technology for business process reengineering, knowledge management, and collaborative learning. Special emphasis will be placed on using groupware technologies and systems to create, store, and distribute explicit and tacit knowledge within contemporary organizations.

OEIS 10 -Network Administration

This course is designed to develop senior-level OEIS students' advanced network administration skills. Both client and server applications will be dealt with, and a strong emphasis will be placed on network operating system software. Students will also be exposed to multi-vendor networking topics. Specific course topics will include setting up and configuring Web and e-mail servers, Web site security using secure sockets layer, the domain name system, the dynamic host configuration protocol, the Windows Internet naming service, remote access, Internet protocol (IP) routing, IP security, network address translators, and other core networking/internetwork applications.

OEIS 11 - Operating Systems

This course will provide the theoretical foundation and practical skills required to install, troubleshoot, maintain, and support various operating systems. A thorough survey of personal computer and intermediate server operating systems available today will be provided, including Microsoft Windows, Linux/Unix, Macintosh OS, and DOS. Topics include their functional similarities and differences, file management distinctions, installation procedures, printer and other peripheral device management, interoperation with legacy systems, maintenance, backup operations, and troubleshooting methods.

OEIS 12 - Information Systems Security

This course is an introduction to end-user systems security from a management perspective. The course emphasizes the methods for the management of information security through the development of policies, procedures, audits, and logs. It also provides an understanding of the techniques used for identifying threats, vulnerabilities, and common human errors, as well as analyses of the legal, ethical, and privacy issues in information systems. It discusses emerging technologies related to systems security.

OEIS 13 - Special Topics

This course is the study of advanced concepts and issues relevant to OEIS. Content will vary according to the needs and interests of the students and the interests and expertise of the faculty. Selected topics should emphasize current technological advances and OEIS management concerns.

Summary and Concluding Remarks

Because a model curriculum must be flexible, these courses and their titles are meant only to provide containers for competencies and instructional modules. The curriculum is presented in a framework of modules within semester courses. In actual implementation, it is expected that course content will be adapted to fit other time frames (e.g., quarters or 1 or 2 credit courses) and course goals. Such alterations are considered consistent with the intent of this model. The seven core courses (OEIS 1-7) contain the competencies that are considered vital. The optional courses (OEIS 8-12) are suggestions for more in-depth work in specialty areas and/or field experiences. Universities can customize courses to meet the needs of their students and the mission of their schools.

The way technology is used today is changing the world at a rapid pace. The student who succeeds in this environment will be someone who combines and effectively synthesizes technology mastery with core knowledge of business skills and

practices. Therefore, educational institutions must be willing to review their own curricula and investigate how to incorporate significant updates to produce the technically competent students who have the 'soft' and 'hard' skills necessary to succeed in the business world. New technologies, organization changes, and accreditation standards are forcing many educational systems to rethink their curricula at the graduate and undergraduate level.

Davis, Feinstein, Gorgone, Longenecker, and Valacich (2001) noted that developing curricula in the IS areas has been an ongoing task since the early 1970s. One example of this is the IS 2002 curriculum which was developed through a group effort between the Association for Computing Machinery (ACM), the Association of Information Technology Professionals (AITP), and the Association for Information Systems (AIS). This collaborative effort emphasized the need for a useful model curriculum which can be adapted to a variety of IS/IT types of degree programs. The same is true for individual courses in model programs. It is necessary to develop frameworks for others to follow when creating or updating course content. In a study by Daigle, Longenecker, Landry, and Pardue (2004), it was noted that 81% of the IS faculty surveyed were aware of the IS 2002 model curriculum but only 12% were committed users. Model curricula are presented as models, not as dictates on course structure or content.

Although there is some overlap between the OEIS Model Curriculum and the IS 2002 Model Curriculum (Gorgone, Davis, Valacich, Topi, Feinstein, & Longenecker, 2002), there are also considerable differences. Several topics that are included in the IS 2002 Model Curriculum are also included in the OEIS model. Some examples include computer systems hardware, networking (LAN/WAN), system administration, and security. The differences, however, insure that graduates from the two curricula will have distinct skills that will allow them to reinforce each other as team members in the workplace.

As technology evolves quickly to create an ever-changing environment, the updating of technology courses is also ever-changing. For colleges/universities to keep course content and develop competent graduates, it is essential that they review their own curricula and the curricula of others. Further research will help others enhance their curricula and in turn help produce quality graduates. It is the intent of OSRA to provide this curriculum model as a baseline to assist administrators and faculty in their effort to improve the quality of their curricula. This curriculum provides the students with the technological skills and core business knowledge to enter an ever-changing work environment successfully.

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